Name:

at1124exam: Radicals and Squares (v826)

Question 1

Simplify the radical expressions.

$\sqrt{50}$ $\sqrt{12}$ $\sqrt{99}$

$\sqrt{5 \cdot 5 \cdot 2}$ $\sqrt{2 \cdot 2 \cdot 3}$ $\sqrt{3 \cdot 3 \cdot 11}$

$5\sqrt{2}$ $2\sqrt{3}$ $3\sqrt{11}$

Question 2

Find all solutions to the equation below:

$$\frac{(x-5)^2}{3} + 10 = 37$$

First, subtract 10 from both sides.

$$\frac{(x-5)^2}{3} = 27$$

Then, multiply both sides by 3.

$$(x-5)^2 = 81$$

Undo the squaring. Remember the plus-minus symbol.

$$x - 5 = \pm 9$$

Add 5 to both sides.

$$x = 5 \pm 9$$

So the two solutions are $x = 14$ and $x = -4$.

Question 3

By completing the square, find both solutions to the given equation. *You must show work for full credit!*

$$x^2 - 6x = 7$$

$$x^2 - 6x + 9 = 7 + 9$$
$$x^2 - 6x + 9 = 16$$
$$(x-3)^2 = 16$$
$$x - 3 = \pm 4$$
$$x = 3 \pm 4$$
$$x = 7 \quad \text{or} \quad x = -1$$

Question 4

A quadratic polynomial function is shown below in standard form.

$$y = 3x^2 + 24x + 39$$

Express the function in **vertex form** and identify the **location** of the vertex.

From the first two terms, factor out 3 .

$$y = 3(x^2 + 8x) + 39$$

We want a perfect square. Halve 8 and square the result to get 16 . Add and subtract that value inside the parentheses.

$$y = 3(x^2 + 8x + 16 - 16) + 39$$

Factor the perfect-square trinomial.

$$y = 3((x+4)^2 - 16) + 39$$

Distribute the 3.

$$y = 3(x+4)^2 - 48 + 39$$

Combine the constants to get **vertex form**:

$$y = 3(x+4)^2 - 9$$

The vertex is at point $(-4, -9)$.